Table 2.2-10. Preplant or preemergence herbicides for conventional, min- , or no-till corn.

See specific product label to determine correct rate for soil type and weed species found in each field.

- These treatments may be used in conventional, reduced-till, and no-till systems.
- Thiocarbamate herbicides (EPTC and butylate) are highly volatile and are lost if left on the soil surface.
- Other than EPTC, treatments may be applied preplant-incorporated or preemergence, unless stated otherwise.
- Incorporation reduces the need for timely rainfall after application and may improve control of certain weeds.
- The higher rates for a given soil may be required for no-till.
- In no-till situations, "burndown" herbicides may be required to control weeds or cover crops present at time of application. Tables 2.2-5, 2.2-6, and 2.2-7 list characteristics of "burndown" herbicides.

Herbicide[1]	*Application*	*Product/A*	*lb ai/A*	*Remarks*
Atrazine 4L	Preplant or preemergence	1–2 qt	1–2	Atrazine may be used at 1–2 qt/A. Most commonly used in combination with other herbicides at 1–1.5 qt. On highly erodible ground with less than 30% surface residue, no more than 1.6 qt may be applied prior to crop emergence. See atrazine restrictions at the end of Table 2.2-7 or refer to a current atrazine label for additional information. *(Restricted-use pesticide and water quality advisory)*
Balance Pro 4SC (isoxaflutole)	Preplant or preemergence	1.5–3.75 fl oz	0.047–0.12	Balance contains isoxaflutole and is similar to Callisto but has more activity on annual grasses. The typical rate for medium soils will be 2.25 to 3 fl oz/A. Tank-mix with pre-grass products (Define, Dual, Harness, TopNotch, Outlook, etc.) to improve grass control and atrazine to improve broadleaf control. This herbicide provides some burndown activity and may be used with other herbicides in a burndown/pre program. Do not use on coarse soils with less than 1.5% organic matter. Plant corn at least 1.5 inches deep. Do not apply to emerged corn. To reduce the potential injury from Balance, use 1.5–2.25 fl oz and tank-mix to broaden weed control spectrum. There are no insecticide restrictions with Balance. Refer to product label for additional restrictions. *(Restricted-use pesticide and water quality advisory)*
Banvel 4S or Clarity 4S (dicamba)	Preemergence or early postemergence	1 pt or 16 fl oz	0.5	Banvel or Clarity may be applied after planting on medium- to fine-textured soils. Do not apply preemergence to soil containing less than 2% organic matter or to coarse-textured soils. (Preemergence applications have a greater potential to injure corn under conditions of excessive moisture and cool temperatures.) Crop tolerance is greatest to dicamba and weeds are generally most susceptible when corn is from the spike to five-leaf stage of growth.
Basis 75DF (rimsulfuron + thifensulfuron)	Preemergence	0.33–0.5 oz	0.015–0.023	Basis is a mixture of rimsulfuron and thifensulfuron (Harmony SG). Soil application of Basis is permitted in the mid-Atlantic region including Pennsylvania. Soil-applied Basis is effective on triazine-resistant lambs- quarters and pigweed. Tank-mix with other products to broaden the spectrum of control. For additional remarks, see Basis remarks in the postemergence herbicide for corn section.
Clarity 4S (dicamba) or Banvel 4S	Preemergence or early postemergence	16 fl oz or 1 pt	0.5	Clarity or Banvel may be applied after planting on medium- to fine-textured soils. Do not apply preemergence to soil containing less than 2% organic matter or to coarse-textured soils. (Preemergence applications have a greater potential to injure corn under conditions of excessive moisture and cool temperatures.) Crop tolerance is greatest to dicamba, and weeds are generally most susceptible when corn is from the spike to five-leaf stage of growth.
Define 60DF or Define 4SC (flufenacet)	Preplant or preemergence	12–20 oz or 15–24 fl oz	0.45–0.75	Flufenacet is available as a single active ingredient in Define and is similar to Dual, Harness, TopNotch, Outlook, etc. It only controls grassy weeds, so it will need to be tank-mixed for control of broadleaf weeds. Radius 4SC is a premix that contains the active ingredients of Balance and Define. Define is weak on yellow nutsedge. The medium soil rate range is 14–16 oz/A 60DF and 17–19 fl oz 4SC. *(Water quality advisory)*
Dual II Magnum 7.64E/Cinch (s-metolachlor)	Preplant or preemergence	1–2 pt	0.96–1.9	Dual and Cinch are similar in activity to Harness, Micro-Tech, Outlook, and Surpass. Dual II Magnum/Cinch contains a crop-safening agent. These may be applied broadcast on up to 5-inch- tall corn prior to weed emergence. The medium soil texture rate is 1.67 pt for Dual II Magnum. For early preplant applications or fields with heavy surface plant residue, the Dual rate may need to be increased by up to 20%. Incorporation improves control of yellow nutsedge. *(Water quality advisory)*
Eradicane 6.7E (EPTC)	Preplant incorporated	5–7 pt	4–6	Eradicane must be incorporated immediately after application. Incorporation may be delayed 4 hours if applied to a dry soil surface. If Eradicane is impregnated on dry fertilizer and applied to dry soil, incorporation must be completed the same day. Delay application and planting until soil warms for johnsongrass and shattercane. Fall tillage, which fragments johnsongrass rhizomes, improves control.

(continued)

Table 2.2-10. Preplant or preemergence herbicides for conventional, min- , or no-till corn (continued).

Herbicide[1]	*Application*	*Product/A*	*lb ai/A*	*Remarks*
Harness 7E or Degree 3.8 ME or Surpass 6.4E or TopNotch 3.2CS (acetochlor)	Preplant or preemergence	1.25–3.0 pt or 2.25–5.0 pt or 1.5–3.75 pt or 2–3.75 qt	1–2.6.0 or 1.07–2.38 or 1.2–3.0 or 1.6–3.0	Harness, Degree, Surpass, and TopNotch contain acetochlor. Acetochlor is similar in activity to Dual, Micro- Tech, and Outlook, but is more active on certain broadleaf weeds. Acetochlor may be applied on up to 11-inch-tall corn depending on the tank-mix partner. The medium soil texture rate is about 2 pt/A for Harness and Surpass, 2.25 qt for TopNotch, and 4 pt for Degree. For early preplant applications or fields with heavy surface plant residue, the rate of acetochlor may need to be increased by up to 20%. Incorporation improves control of yellow nutsedge. *(Restricted-use pesticide and water quality advisory)*
Lorox 50DF (linuron)	Preemergence	0.7–1.0 lb	0.3–0.5	Lorox applied at 0.7 to 1.0 lb/A will help control TR lambsquarters. Do not incorporate. Plant corn at least 1.5 inches deep to minimize risk of crop injury. *(May cause crop injury under adverse conditions)*
Micro-Tech 4ME	Preplant or preemergence	2–4 qt or 3–6 lb	2–4	Micro-Tech is an encapsulated formulation of alachlor. It is similar in activity to Dual, Harness, Outlook, and Surpass. Micro-Tech may be applied on up to 5-inch-tall corn prior to weed emergence. The medium soil texture rate is about 2.25 qt/A. For early preplant applications or fields with heavy surface plant residue, increase the rate of alachlor by up to 20%. Incorporation improves control of yellow nutsedge. *(Restricted-use pesticide and water quality advisory)*
Outlook 6.0E (dimethenamid-P)	Preplant or preemergence	10–21 fl oz	0.47–0.98	Outlook is similar in activity to Dual, Harness, Micro-Tech, and TopNotch. Outlook (dimethenamid-P) may be applied preemergence on up to 12-inch-tall corn prior to weed emergence. The medium soil texture rate is 16 fl oz/A for Outlook. For early preplant applications or fields with heavy surface plant residue, increase the Outlook rate by 1–2 fl oz/A. Lower use rates, 6–16 fl oz/A, may be used in situations where partial control or reduced length of residue control is required, such as early postemergence applications or preemergence applications followed by postemergence herbicides. Incorporation improves control of yellow nutsedge. *(Water quality advisory)*
Princep 90DF (simazine)	Preplant or preemergence	1.1–3.3 lb	1–3	Princep is similar to atrazine but has better grass activity and less broadleaf control. Like atrazine, Princep can persist in soil and leave carryover residues. Use in combination with other herbicides to lower the necessary rate and broaden the weed spectrum. If using Princep in combination with atrazine, follow recrop restrictions. *(Water quality advisory)*
Prowl 3.3E or Prowl H2O 3.8CS (pendimethalin)	Preemergence or early postemergence	1.8–4.0 pt or 3.0–4.0 pt	0.75–1.65 or 1.4–1.9	Plant corn at least 1.5 inches deep to avoid Prowl injury. Do not incorporate. Must be applied after planting up until corn reaches 30 inches tall. Preemergence applications can injure corn. Delaying application until spike stage helps maximize crop safety. Prowl H2O is a water-based capsule suspension formulation that provides similar weed control as the older 3.3E product but causes less staining and odor..
Python 80WDG (flumetsulam)	Preplant or preemergence	0.8–1.14 oz	0.04–0.057	Flumetsulam is available as a single active ingredient in Python WDG. Apply before crop or weed emergence. Plant corn at least 1.5 inches deep. Do not use where soil pH is greater than 7.8, where organic matter is less than 1.5% or when extended cool, wet conditions exist. Apply all insecticides in a T band or a band to avoid serious crop injury. Do not use if Counter insecticide was applied. IMI corn hybrids will reduce the potential for crop injury. See Table 2.2-19 for recrop restrictions. To prevent herbicide resistance, avoid repeated annual applications of soil-persistent ALS herbicides. See "Herbicide Resistance Management" in Part 2, Section 1 for more information. *(Water quality advisory)*
Resolve 25DF	Preemergence	0.5–2.0 oz	0.0078–0.03	Resolve can be applied pre and may be tank-mixed with full or reduced rates of other soil-applied corn herbicides. See additional comments about Resolve in Table 2.2-13 in the postemergence herbicides for corn section.

(continued)

Table 2.2-10. Preplant or preemergence herbicides for conventional, min- , or no-till corn (continued).

Herbicide[1]	*Application*	*Product/A*	*lb ai/A*	*Remarks*
Mixtures				
Bullet 4L (alachlor + atrazine)	Preplant or preemergence	2.5–6.0 qt	2.5–6.0	These mixtures contain one of the chloroacetamide herbicides plus atrazine. Bicep Lite II Magnum, Cinch ATZ Lite, Harness Xtra 6L, G-Max Lite, and Keystone LA are premixes of reduced-atrazine-rate ratios. The application rates based on soil texture for each of these products are listed in Table 2.2-11. These products may be applied to emerged corn in a water carrier; refer to Table 2.2-12 for maximum corn and weed size restrictions. Degree Xtra can be applied early post in a UAN carrier if the temperature is below 85°F. Some corn leaf burn should be expected. Refer to label for more details. Do not include surfactants, crop oils, or other additives. See individual component sections in this table and atrazine use restrictions at the end of Table 2.2-7 for additional information. *(Restricted-use pesticides and water quality advisory)*
or		or	or	
Bicep II Magnum 5.5L/Cinch ATZ (s-metolachlor + atrazine)		1.3–2.6 qt	1.8–3.6	
or		or	or	
Bicep Lite II Magnum 6L/Cinch ATZ Lite (s-metolachlor + atrazine)		0.9–2.2 qt	1.35–3.3	
or		or	or	
Degree Xtra 4.04 ME (acetochlor + atrazine)		2.9–3.7 qt	2.9–3.7	
or		or	or	
FulTime 4CS/EC (acetochlor + atrazine)		2.5–5.0 qt	2.5–5.0	
or		or	or	
Guardsman Max 5L (dimethenamide-P + atrazine)		2.4–4.0 pt	1.5–2.5	
or		or	or	
G-Max Lite 5L (dimethenamid-P + atrazine)		2–3.5.0 pt	1.25–2.19	
or		or	or	
Keystone 5.25SE		2.2–3.0 qt	2.9–3.9	
or		or	or	
Keystone LA 5.5SE (acetochlor + atrazine)		1.8–3.0 qt	2.48–4.13	
or		or	or	
Harness Xtra 6L (acetochlor + atrazine)		1.8–2.3 qt	2.7–3.4	
or		or	or	
Harness Xtra 5.6L (acetochlor + atrazine)		1.4–3.0 qt	2.0–4.2	
Hornet 78.5WDG (flumetsulam + clopyralid)	Preplant or preemergence	3–5 oz	0.13–0.21	Hornet is a mixture of flumetsulam (Python) + clopyralid (Stinger). The addition of clopyralid improves ragweed control and may help with Canada thistle. The medium soil texture rate is 5 oz/A. Hornet WDG may be used at 3 oz/A in combination with an atrazine/pre-grass herbicide premix. Apply at soil-applied rates to corn up to spike stage before weed emergence. Plant corn at least 1.5 inches deep, do use where soil pH is greater than 7.8, where organic matter is less than 1.5%, or when extended cool, not wet conditions exist. Apply all soil insecticides in a T-band or a band to avoid serious crop injury. Do not use if Counter insecticide was applied. See Table 2.2-17 for recrop restrictions. To prevent herbicide resistance, avoid repeated annual applications of soil-persistent ALS herbicides. See "Herbicide Resistance Management" in Part 2, Section 1 for more information. *(Water quality advisory)*
Lexar 3.7SC (s-metolachlor + mesotrione + atrazine)	Preplant or preemergence	3.0–3.5 qt	2.78–3.24	Lexar and Lumax are mixtures of s-metolachlor (Dual II Magnum), mesotrione (Callisto), and atrazine. The typical use rates in all tillage systems are 3 qt/A Lexar and 2.5 qt/A Lumax. Lexar may be applied broadcast on up to 12-inch-tall corn and Lumax may be applied broadcast on up to 5-inch-tall corn, but prior to annual grass emergence. Do not apply more than 3.5 qt/A Lexar or 3 qt/A Lumax per growing season. Do not apply Callisto following Lexar, Lumax, or Camix during the same season. Do not apply Lexar or Lumax early post if the corn was treated with Counter insecticide. Do not tank mix Lexar or Lumax with organophosphate (OP) or carbamate insecticides and apply as a foliar post application. Do not make a foliar post application of any OP or carbamate insecticide within 7 days before or 7 days after a Lexar or Lumax application or severe corn injury may occur. Corn, soybeans, small grains, and sorghum may be planted the spring following Lexar or Lumax application. Camix is similar to Lumax, but contains no atrazine. The typical use rate is 2 qt/A. *(Restricted-use pesticide and water quality advisory)*
or		or	or	
Lumax 3.95SC (s-metolachlor + mesotrione + atrazine)		2.5–3.0 qt	2.47–2.96	
or		or	or	
Camix 3.67SC (s-metolachlor + mesotrione)		2.0–2.4 qt	1.8–2.2	
Marksman 3.2L (dicamba + atrazine)	Preemergence or early postemergence	2–3.5 pt	0.8–1.4	Marksman may be applied after planting on medium- to fine-textured soils. Do not apply preemergence on soil containing less than 2% organic matter or to coarse-textured soils. Preemergence applications have a greater potential to injure corn under excessive moisture or cool temperature conditions. Crop tolerance is greatest and weeds are generally most susceptible to Marksman when corn is from spike to five-leaf stage of growth. See remarks under atrazine. *(Restricted-use pesticide and water quality advisory)*

(continued)

Table 2.2-10. Preplant or preemergence herbicides for conventional, min- , or no-till corn (continued).

Herbicide[1]	*Application*	*Product/A*	*lb ai/A*	*Remarks*
Princep 90DF (simazine) plus Atrazine 90DF	Preplant or preemergence	1.1–1.7 lb plus 1.1–1.7 lb	1–1.5 plus 1–1.5	Both simazine and atrazine have long soil residuals. Plant corn, sorghum, or sudangrass the following year. Simazine improves annual grass control; use 2:1 ratio of simazine to atrazine in fields with heavy grass pressure. See comments under atrazine. *(Atrazine is a restricted-use pesticide, and both atrazine and simazine have a water quality advisory.)*
Prowl 3.3E or H2O 3.8CS (pendimethalin) plus Atrazine 90DF	Preemergence or early post emergence	1.8–3.6 pt or 3–4 pt plus 1.1–2.2 lb	0.75–1.5 or 1.4–1.9 plus 1.0–2.0	Plant corn at least 1.5 inches deep to avoid Prowl injury. Do not incorporate. Must be applied after planting up until corn reaches 12 inches tall. Preemergence applications can injure corn. Delaying application until spike stage helps maximize crop safety. See remarks under atrazine. *(Atrazine is a restricted-use pesticide and has a water quality advisory.)*
Radius 4SC (isoxaflutole + flufenacet)	Preplant or preemergence	14–21 fl oz	0.44–0.66	Radius is a premix of isoxaflutole (Balance Pro) and flufenacet (Define). The typical use rate for medium soils is 18 fl oz/A. Tank-mix with atrazine to improve broadleaf control. Radius is weak on yellow nutsedge. Do not use Radius if the water table is less than 25 feet below the ground surface and the soils are coarse with less than 2% organic matter. Plant field corn at least 1.5 inches deep. Do not apply to emerged corn. There are no insecticide restrictions with Radius. Refer to product label for additional information and restrictions. *(Restricted-use pesticide and water quality advisory)*
Shotgun 3.25L (atrazine + 2,4-D)	Preplant or preemergence	2–3 pt	0.81–1.22	The 2-pint rate contains 0.56 lb atrazine + 0.25 lb 2,4-D. Apply 7 to 14 days before planting or 3 to 5 days after planting for greater crop safety. Do not apply preplant incorporated. Plant corn at least 1.5 inches deep. See atrazine restrictions at the end of Table 2.2-7. *(Restricted-use pesticide and water quality advisory)*
SureStart 4.25SE (acetochlor + flumetsulam + clopyralid)	Preplant, preemergence, or early postemergence	1.5 – 2 pt	0.8 – 1.06	SureStart is intended to be used with Roundup Ready or Liberty Link field or silage corn hybrids. When applied pre, it is designed to provide early season control of common annual grasses and broadleaf weeds to allow better timing of the in-crop application of glyphosate or glufosinate. The typical medium soil rate is 1.75 pt/ A SureStart. SureStart does not contain atrazine, so it provides a non-atrazine alternative for triazine-sensitive areas. However, atrazine, glyphosate, 2,4-D, and other herbicides can be tank-mixed with SureStart to broaden the weed control spectrum. It contains acetachlor, so be sure to follow acetachlor use restrictions for soil type, organic matter, and depth to water table. Adequate soil moisture is required for optimum herbicidal activity. If adequate soil moisture is not received within 7–10 days after a surface-applied treatment, a shallow cultivation is recommended. Observe the rotational restrictions on the label. Injury to corn has been observed when cool, wet soil conditions follow application. Apply soil insecticides in-furrow, a T-band or a band. To avoid serious crop injury if using OP insecticides apply in a T-band or a band. Do not use if Counter or Thimet insecticide was applied. Refer to label for additional restrictions with soil insecticides. Corn must be planted at least 1.5 inches deep. Do not use as a soil treatment in fields with less than 1.5% organic matter, unless if the risk of crop injury is acceptable.

1. See Table 2.2-1 for additional formulations or trade names containing some of these same active ingredients.

ATRAZINE USE RESTRICTIONS

Preplant or Preemergence

On highly erodible soils (as defined by the U.S. Natural Resources Conservation Service):

- Fields where more than 30 percent of the soil surface is covered with plant residue at planting, apply a maximum of 2.0 lbs of active ingredient per acre as a broadcast spray.
- Fields where less than 30 percent of the soil surface is covered with plant residue at planting, apply a maximum of 1.6 lbs of active ingredient per acre as a broadcast spray.
- Apply a maximum of 2.0 lbs of active ingredient per acre as a broadcast spray.

POSTEMERGENCE

- If no atrazine was applied prior to crop emergence, use a maximum rate of 2.0 lbs of active ingredient per acre.
- If a soil-applied application was made in the same calendar year, the combined preplant or preemergence and postemergence applications may not exceed 2.5 lbs of active ingredient per acre.

SAFETY PRECAUTIONS FOR USING ATRAZINE

- Do not mix, load, or apply within 50 feet of drinking water wells, livestock wells, agricultural drainage wells, irrigation wells, abandoned wells, or sinkholes.
- Do not mix or load within 50 feet of intermittent streams, perennial streams, rivers, lakes, or reservoirs.
- Do not apply within 200 feet of lakes or reservoirs.
- Do not apply within 66 feet of the points where surface water runoff enters intermittent streams, perennial streams, or rivers. The 66-foot buffers should be planted to a crop or seeded with grass on highly erodible land.